FISH SAMPLING

Purpose

This Meteorology and Air Quality Group (MAQ) procedure describes the methods of collection for fish samples as part of the foodstuffs monitoring program.

Scope

This procedure applies to the individual(s) assigned to collect fish as part of the Foodstuffs Monitoring Program.

In this procedure

This procedure addresses the following major topics:

Hazard Control Plan

The hazard evaluation associated with this work is documented in Attachment 1: Initial risk = **medium**. Residual risk = **low**. Work permits required: Scientific Collection permit from NM Game and Fish.
First authorization review date is one year from group leader signature below; subsequent authorizations are on file in group office.

Signatures

Prepared by: Phil Fresquez. Environmental Surveillance Team Leader	Date: 5/12/04
Approved by: Terry Morgan, QA Officer	Date: 5/12/04
Work authorized by: Jean Dewart, MAQ Group Leader	Date: 5/14/04

05/24/04

General information about this procedure

Attachments

This procedure has the following attachments:

Number	Attachment Title	No. of pages
1	Hazard Control Plan	2
2	Chain-of-Custody Record	1
3	Electrofishing Orientation	1
4	Electrofishing Field Safety Checklist	1
5	Fish Collection Locations and Physical Characteristics	1

History of revision

This table lists the revision history and effective dates of this procedure.

Revision	Date	Description Of Changes
0	6/28/96	New document.
1	3/99	Reformatted in accordance with LIR300-00-01, Safe Work Practices
2	4/01	Added new Section 9.0, Training
3	4/02	Added new text regarding electrofishing procedures.
4	4/03	Team name change to Environmental Surveillance.
5	5/12/04	Updated and reformatted document to conform with MAQ procedures.

Who requires training to this procedure?

The following personnel require training before implementing this procedure:

- MAQ personnel assigned to collect fish samples

Training method

The training method for this procedure is **on-the-job** training by a previously-trained individual and is documented in accordance with the procedure for training (MAQ-024).

Annual retraining is required and will be by self-study (“reading”) training.

General information, continued

Prerequisites

In addition to training to this procedure, the following training is also required prior to performing this procedure:

- First Aid
- Cardiopulmonary Resuscitation (CPR)
- MAQ-Field, "General Field Safety for All Employees"
- MAQ-710, "Boat and Raft Safety"
- New Mexico *Better Boating and Regulations*

At least one person in each field crew must have the following training:

- New Mexico Boating Safety Class (offered by State of NM Parks Dept.)

All participants in fish sampling on the water must know how to swim.

Definitions specific to this procedure

Foodstuffs: produce (fruits, vegetables, and grains), fish (surface feeders and bottom feeders), eggs, milk, brewed tea, honey, and game animals.

Electrofishing: The taking of fish with direct electric current, which causes the fish to surface.

Gill nets: nets stretched across a body of water to capture fish for sampling. Usually kept in place for (no more than) 24 hours.

Dip nets: nets used to catch fish that have surfaced using the electrofishing method

References

The following documents are referenced in this procedure:

- MAQ-024, "Personnel Training"
- MAQ-710, "Boat and Raft Safety"
- MAQ-Field, "General Field Safety All Employees"
- New Mexico Better Boating and Regulations

Note

Actions specified within this procedure, unless preceded with "should" or "may," are to be considered mandatory guidance (i.e., "shall").

Worker Safety

Precautions and limitations

This document establishes the basic requirements for collecting fish samples. Work performed under this procedure by LANL personnel will occur only after required training to applicable documents has been completed and documented.

Safe work practices requirements

Project Personnel – A minimum of two people is required to go out in the field.

Personal Protective Equipment – See equipment list on page 6 of this document.

Do not perform work under conditions you consider unsafe. Before beginning work described in this procedure, review safety needs and requirements, identify hazards, and develop hazard mitigation measures.

Specific safety guidelines for electrofishing:

- leave the water immediately if waders or gloves develop leaks
- avoid operation of electrofishing equipment near people, pets, livestock, or wildlife that are in or near the water
- make all electrical connections or disconnections while the unit is turned off
- refuel generators with equipment turned off and when surfaces have cooled.

Sample Collection

Permit needed

Before any work begins, a permit for scientific collection must be obtained from the New Mexico Department of Game and Fish. The application form, *Authorization for Taking Protected Wildlife for Scientific and/or Education Purposes*, may be requested from the New Mexico Department of Game and Fish, PO Box 25112, Santa Fe, NM 87501.

Sample types

Two categories of fish are collected:

- predator feeders: rainbow trout, brown trout, kokanee salmon, largemouth and smallmouth bass, white crappie, and walleye
- bottom feeders: white sucker, channel catfish, carp, and carp suckers

Sample locations

Fish samples, both game and non-game, are collected at two types of sites with respect to Los Alamos National Laboratory:

- upstream: a combination of fish from Abiquiu dam, Heron dam, or El Vado dam
- downstream: Cochiti Lake.

Number of samples

Collect 5 to 10 composite fish samples at both upstream and downstream locations:

	Heron, El Vado, or Abiquiu Dams	**Cochiti Lake**
For Radiochemical Analysis		
Game Fish	5 to 10	5 to 10
Non-Game Fish	5 to 10	5 to 10
For Mercury Analysis		
Game Fish	5 to 10	5 to 10
Non-Game Fish	5 to 10	5 to 10
For Organics Analysis		
Game Fish	5 to 10	5 to 10
Non-Game Fish	5 to 10	5 to 10
Note: The project leader uses professional judgment to determine the number of samples collected for both composite and individual fish samples at each sample site. Budget constraints and/or time limitations could be factors in the determination.		

Continued on next page.

Sample Collection, continued

Equipment needed

Additional specific equipment needed for going on the lake with the boat is given in the operating procedure for boat and rafts (MAQ-710).

The following equipment is needed for fish sampling:

- first-aid kit
- cellular telephone and/or radio
- rubber gloves that cover the forearm
- safety glasses (substitute polarized sunglasses when electrofishing)
- chest waders with nonslip soles when using wading method
- hip boots or tennis shoes when using boat method
- life vest
- hat
- ice chest with ice
- sharp knife and Kevlar safety gloves for use with knife
- zip-lock sample bags (gallon size)
- marker for labeling bags
- fishing equipment (gill nets, rods-and-reels)
- chain-of-custody forms (Attachment 2)
- "Electrofishing Field Safety Checklist" (Attachment 4)

The following items are needed in addition to the above list when sampling for organics analysis

- digital camera
- pre-labeled amber glass screw-top jars
- form "Fish Collection Locations and Physical Characteristics" (attachment 5)

Before leaving LA County

Identify a Point-of-Contact (providing pertinent information of destination, expected time-in, and how to notify field team). When leaving Los Alamos County, notify group office to place you on travel status. Check conditions of vehicle, trailer, and boat for safe operation. Ensure that you have a working cell phone and a pager.

Continued on next page.

Sample Collection, continued

Steps for harvesting fish

In late spring/early summer, travel to the sampling locations at Cochiti and at least one of the upstream lakes to collect fish for analysis. At each lake, begin by following the boat/raft launching instructions in MAQ-710.

Gill nets

To collect fish using gill nets, perform the following steps:

Step	Action
1	Identify several sampling locations where nets can be set.
2	At each location, anchor one end of the net to a fixed point (e.g., a partially submerged tree). Stretch the net and attach a weight to the bottom of the net at the other end and a float to the top. This float-weight system is effective for maintaining proper positioning of the net.
3	Return to the net location no more than 24 hours later; carefully raise the net from the water (avoid entangling the net), and remove fish from the net.
4	Collect about 5 to 8 kg (11 to 18 lb fresh weight) of each species.
5	Place the fish in large plastic bags labeled with sampling location and date. Pack the fish on ice for transport back to the Laboratory.
6	Complete a chain-of-custody form (Attachment 2) with the appropriate sampling information. Maintain proper chain-of-custody on the samples. See chapter *Chain-of-custody for samples*.
7	Clean the net and neatly roll it for storage.
8	Once at the lab, store the samples on ice or in a freezer until they are processed (normally within two working days). Follow preparation and processing methods described in MAQ-706 (*Processing and Submitting Samples*).

Electrofishing

To collect fish by electrofishing, follow the steps in the next chapter *Electrofishing* then follow the steps below.

Step	Action
1	Begin sampling at the upstream boundary of the sampling reach proceeding in a downstream direction by maneuvering the boat along one shoreline.
2	Start the electrofishing probe at a low voltage (150v) and a low frequency (30 Hz). If ineffective in causing fish to surface, then gradually increase until the fish surface.
3	Use dip nets to harvest fish.
4	Collect about 5 to 8 kg (11 to 18 lbs. fresh weight) of each species.
5	Place the fish in large plastic bags labeled with sampling site and date. Pack the fish on ice for transport back to the Laboratory.

Steps continued on next page

Sample Collection, continued

Step	Action
6	Complete a chain-of-custody form (Attachment 2) with the appropriate sampling information. Maintain proper chain-of-custody on the samples. See chapter *Chain-of-custody for samples*.
7	Once at the lab, store the samples on ice or in a freezer until they are processed (normally within two working days). Follow preparation and processing methods described in MAQ-706 (*Processing and Submitting Samples*).

Sampling for organic analysis

Some fish are collected for organic analysis and are handled differently than the regular sampling. Follow steps below.

Step	Action
1	Keep the largest fish (minimum 35g fwt).
2	Photograph each site using digital camera.
3	Fill out chain-of-custody form (Attachment 2) with appropriate sampling information. Maintain proper chain-of-custody on the samples. See chapter *Chain-of-custody for samples*.
4	Fill in as much as possible of the Fish collection Locations and Physical Characteristics (Attachment 5); complete the form at the lab.
5	Place whole fish into pre-labeled amber screw-top jars. Cut fish into smaller portions if necessary to fit into container.
6	Place samples into ice-filled chest for transport to the laboratory.
7	Once at the laboratory, keep cool or frozen and in the dark until submittal to analytical laboratory. Follow preparation and processing methods described in MAQ-706 (*Processing and Submitting Samples*).

Electrofishing

Use of electrofishing

Electrofishing is used to collect fish from area lakes.

Safety inspections

Before launching the boat, get the boat and all electrofishing equipment inspected at the lake by the officials in charge of boating safety.

Safety issues

All operators must be familiar with the "Electrofishing Orientation" (attachment 3).

When electrofishing:

- leave the water immediately if waders or gloves develop leaks.
- avoid operation of electrofishing equipment near people, pets, livestock, or wildlife that are in or near the water.
- make all electrical connections or disconnections while the unit is turned off.
- refuel generators with equipment turned off and when surfaces have cooled.

Generator operation

Be familiar with the operators manual for the generator.

Wear hearing protection if you will be close to the generator for extended periods.

When refueling: wait at least 5 minutes for the generator to cool before adding more fuel.

Preparation for electrofishing

Complete the Electrofishing Field Safety Checklist (Attachment 4).

Boom electrode deployment

To deploy the boom with the electrode array, perform the following steps:

Step	Action
1	Move the booms to the upper travel supports.
2	Connect the safety snaps to the eye on the end of each boom.

Steps continued on next page.

Electrofishing, continued

Step	Action
3	Snap the electrode array on the end of the boom.
4	Check to be sure the electrode array is secure to the boom.
5	Expand the array by loosening the nut on the center of the array and sliding the center until the array is fully expanded.
6	Tighten the nut to lock the array in position
7	Proceed to the forward end of the boom and loosen the boom clutch by turning the large nut with spokes counter-clockwise with your foot.
8	Use the chain attached to the boom to move it forward until it points straight-ahead.
9	Tighten the boom clutch by turning the large nut clockwise with your foot.
10	Adjust the depth of the electrodes by placing the chain on the boom into the notch on the handrail; the exposed cables on the electrode array must be completely under water.
11	Bbefore high-speed travel, move the booms back into the upper travel supports and collapse the electrode array.

Chain-of-custody for samples

Maintaining custody of samples

A sample is physical evidence collected from a facility or the environment. Chain-of-custody must be documented for all samples used to demonstrate compliance. Verify that the possession and handling of samples is traceable at all times. A sample is considered in custody if it is one of the following:

- In one's physical possession.
- In one's view after being in one's physical possession.
- In one's physical possession and then locked up so that no one can tamper with it.
- Kept in a secure area where access is restricted to authorized and accountable personnel only.

NOTE: A secured area is an area that is locked, such as a room, cooler, vehicle, or refrigerator. If the area cannot be secured by locking, use a custody seal to secure the area or the sample container.

Transferring custody of samples

Whenever samples are transferred into the custody of another person or organization, complete the "relinquished by/received by," "date," and "time" sections of the form (Attachment 2). These sections of the form must provide a complete history of custody of the samples from collection to transfer to the analytical laboratory.

If chain-of-custody is broken

Whenever there is a break in the chain of custody of a sample, document the failure by initiating a deficiency report in accordance with the procedure for deficiencies (MAQ-026). [The deficiency process will document the occurrence, evaluate the potential impact (if any) on the samples, and propose a fix to prevent recurrence.]

Records resulting from this procedure

Records

The following records generated as a result of this procedure are to be submitted **within one year** as records to the records coordinator:

- Electrofishing Field Safety Checklist (attachment 4)
- Chain-of-Custody record (attachment 2)
- Fish collection Locations and Physical Characteristics (attachment 5)

HAZARD CONTROL PLAN

1. The work to be performed is described in this procedure.
"Fish Sampling"

2. Describe potential hazards associated with the work (use continuation page if needed).

Animal Injuries- (snakes, spiders, mountain lions, etc.)
Falls/tripping – uneven terrain, carrying awkward objects or equipment
Electrical shock
Weather—Lightning
Boat/raft accidents
Drowning
Handling heavy objects (loading/unloading/transporting/postioning)
Use of knives

3. For each hazard, list the likelihood and severity, and the resulting initial risk level (before any work controls are applied, as determined according to LIR300-00-01, section 7.2)

Animal Injuries- (snakes, spiders, mountain lions, etc.)—remote/critical = minimal
Falls/tripping—occasional/moderate = low
Electrocution—improbable/catastrophic = medium
Weather—Lightning—remote/catastrophic = low
Boat/raft accidents—improbable/catastrophic = medium
Drowning—improbable/catastrophic = medium
Handling heavy items—occasional/moderate = low
Use of knives—occasional/moderate = low

Overall *initial* risk: ☐ Minimal ☐ Low ☒ Medium ☐ High

4. Applicable Laboratory, facility, or activity operational requirements directly related to the work:
☒ None ☐ List: Work Permits required? ☐ No ☒ List:

IACUC Protocol 97-59-02R
NM Dept. Game & Fish Permit 2864

HAZARD CONTROL PLAN, continued

5. Describe how the hazards listed above will be mitigated (e.g., safety equipment, administrative controls, etc.):

Animal Injuries – Read the "Field Safety for All" document and use common sense to avoid these types of injuries.
Electrocution—Avoid contact with electrodes and water during operation. Ensure that your skin and clothing are dry. Always operate under the 'buddy system' with effective means of communication. Read and understand 'Electrofishing Orientation' (Attachment 2). Get equipment inspected at lake by officials who regulate boating safety. System has a dead-man switch and foot pedal for operation.
Falls/tripping – Read the "Field Safety for All" document on awareness of trips, slips, and falls.
Animal Injuries – Read the "Field Safety for All" document and use common sense to avoid these types of injuries.
Weather (lightning) -- Read the "Field Safety for All" document and seek shelter when necessary.
Boat and raft accidents—Review a copy of the "New Mexico Better Boating and Regulations" (published by the New Mexico Parks and Recreation Bureau of Boating Safety).
Drowning—All participants must know how to swim and must wear life jackets at all times while on board the boat/raft.
Handling heavy objects --Use proper lifting techniques.
Use of knives—Use care when cutting and wear protective (cut-resistant, Kevlar) gloves.

6. Knowledge, skills, abilities, and training necessary to safely perform this work (check one or both):

☒ Group-level orientation (per MAQ-032) and training to this procedure.
☒ Other → See training prerequisites on procedure page 3. Any additional describe here:

7. Any wastes and/or residual materials? (check one) ☒ None ☐ List:

8. Considering the administrative and engineering controls to be used, the *residual* risk level (as determined according to LIR300-00-01, section 7.3.3) is (check one):

☐ Minimal ☒ Low ☐ Medium (requires approval by Division Director)

9. Emergency actions to take in event of control failures or abnormal operation (check one):

☐ None ☒ List:

For all injuries, provide first aid and see that injured person is taken to Occupation Medicine (only if immediate medical attention is not required) or the hospital.

Signature of preparer of this HCP: This HCP was prepared by a knowledgeable individual and reviewed in accordance with requirements in LIR 300-00-01 and LIR 300-00-02.

Preparer(s) signature(s)	Name(s) (print) /Position	Date

Signature by group leader on procedure title page signifies authorization to perform work for personnel properly trained to this procedure. This authorization will be renewed annually and documented in ESH-17 records. Controlled copies are considered authorized. Work will be performed to controlled copies only. This plan and procedure will be revised according to MAQ-022 and distributed according to MAQ-030.

Environmental Surveillance Team Chain-of-Custody Record

This form is from MAQ-702

Project Contact _____

Contact Phone No. _____ **MS**_____

Project Name Fish Sampling

_____

_____

Account Code _____

Cost Center _____

Program Code _____

Date Collected	Time Collected	Station Name/Number	Number of Samples	Analysis Requested	Remarks

Relinquished by (print and sign)	Date	Relinquished by (print and sign)	Date	Relinquished by (print and sign)	Date
	Time		Time		Time
Received by (print and sign)		**Received by (print and sign)**		**Received by (print and sign)**	
	Date		Date		Date
	Time		Time		Time

Samplers (print names and initial) _____

Comments

ELECTROFISHING ORIENTATION

1. Electrofishing is an inherently hazardous activity in which safety is the primary concern. The electrical energy used in electrofishing is sufficient to cause death by electrocution.

2. During operations, it is critical to avoid contact with electrodes and surrounding water. The electric field is most intense near the electrodes and can extend 5 to 10 meters outward.

3. The electrodes are energized by the power source, a generator or battery, and controlled by safety switches; these switches must remain off until the signal is given by the operator to begin electrofishing.

4. The power source has a main switch that must be turned off immediately if an emergency occurs.

5. The electrodes are usually metal probes suspended in the water. If direct current is used from the boat, the anodes (+) are in the front of the boat to catch fish and the cathodes (–) may be suspended from the sides; both can produce electroshock. When a metal boat is the cathode, the boat is safe as long as all the metal surfaces inside it are connected to the hull.

6. Movable anodes on a boat are dangerous, especially on metal boats. All electrodes on a conventional electrofishing boat should be in a fixed position during operation.

7. Dry skin and clothing are good protection against electroshock. The body should be fully clothed during electrofishing. Rubber knee boots are minimal protection, as are rubber gloves. A personal flotation device must be worn at all times while onboard the craft. Ear protection is necessary for those working near the generator.

8. At least two members of the crew must have knowledge of CPR and first aid. A first aid kit and a fire extinguisher must be within immediate reach during an operation. Electroshock can cause heart fibrillation or respiratory arrest; CPR can cure only the latter. The crew must know the location of the nearest defibrillation unit.

9. A communication system, particularly hand signals, must be available to all crew members. When multiple anodes are used in an operation, the buddy system must be used. Above all, NEVER OPERATE ALONE.

10. Stunned fish should be removed from the electric field as soon as possible and not subjected to continuous electroshock by being held in the dip net. Using the anode as a dip net is unhealthy for the fish and people and should be avoided.

11. An electrofishing operation should proceed slowly and carefully; avoid chasing fish and other sudden maneuvers. Night activities require bright, bow-mounted headlights. Operations should cease during lightning and thunderstorms; use discretion during rain. Avoid electrofishing too close to bystanders, pets, or livestock.

12. All crew members should know who their leader is and recognize his or her authority as final in operational decisions. However, every crew member has the right to ask questions or express concern about any safety aspect of operations. A crew member has the right to decline participation in an electrofishing operation, without fear of employer recrimination, if he or she feels unsafe in participation.

ELECTROFISHING FIELD SAFETY CHECKLIST

Electrical Equipment

- ❑ Electrical connections secure and protected
- ❑ Gages and wiring in proper working condition
- ❑ "Deadman switch" in operating condition
- ❑ Anodes in good condition; attached to handles securely [wadeable streams]

Ancillary Equipment

- ❑ Fire extinguisher - fully charged
- ❑ First-aid kit present
- ❑ Dip net handles constructed of nonconductive material

Crew Members

- ❑ Trained in electrofishing operation
- ❑ Wearing rubber gloves (inspected for leaks)
- ❑ Wearing chest waders (inspected for leaks) with nonslip soles [wadeable streams]
- ❑ Wearing hip boots (inspected for leaks) [nonwadeable streams]

_____ _____

Signature Date

Meteorology and Air Quality Group, MAQ

FISH COLLECTION LOCATIONS AND PHYSICAL CHARACTERISTICS

This form is from MAQ-702

Date	Sample No.	Site	GPS Location	Species	Weight	Length	Girth

Samples collected by:

Signature	Name (print)	Z no.	Date

Field team member:

Signature	Name (print)	Z no.	Date

Field team member:

Signature	Name (print)	Z no.	Date

Field team member:

Signature	Name (print)	Z no.	Date